1. Determine the horizontal and/or oblique asymptotes in the rational function below.
$$f(x) = \frac{6x^3 + 29x^2 - 5x - 100}{3x^2 + 10x - 25}$$

   A. Horizontal Asymptote of $y = 2.0$

   B. Horizontal Asymptote of $y = 2.0$ and Oblique Asymptote of $y = 2x + 3$

   C. Oblique Asymptote of $y = 2x + 3$.

   D. Horizontal Asymptote of $y = -5.0$ and Oblique Asymptote of $y = 2x + 3$

   E. Horizontal Asymptote at $y = -5.0$

2. Determine the vertical asymptotes and holes in the rational function below.
$$f(x) = \frac{16x^3 + 64x^2 + 79x + 30}{12x^2 + x - 6}$$

   A. Vertical Asymptote of $x = 0.667$ and hole at $x = -0.75$

   B. Holes at $x = 0.667$ and $x = -0.75$ with no vertical asymptotes.

   C. Vertical Asymptotes of $x = 0.667$ and $x = -0.75$ with no holes.

   D. Vertical Asymptote of $x = 1.333$ and hole at $x = -0.75$

   E. Vertical Asymptotes of $x = 0.667$ and $x = -1.25$ with a hole at $x = -0.75$

3. Determine the horizontal and/or oblique asymptotes in the rational function below.
$$f(x) = \frac{3x^2 - 7x - 20}{9x^3 + 18x^2 - 7x - 20}$$

   A. Horizontal Asymptote of $y = 0$

   B. Horizontal Asymptote of $y = 0.333$

   C. Horizontal Asymptote at $y = 4.000$

    D. Horizontal Asymptote of $y = 0.333$ and Oblique Asymptote of $y = 3x + 13$

    E. Oblique Asymptote of $y = 3x + 13$.

4. Which of the following functions *could* be the graph below?
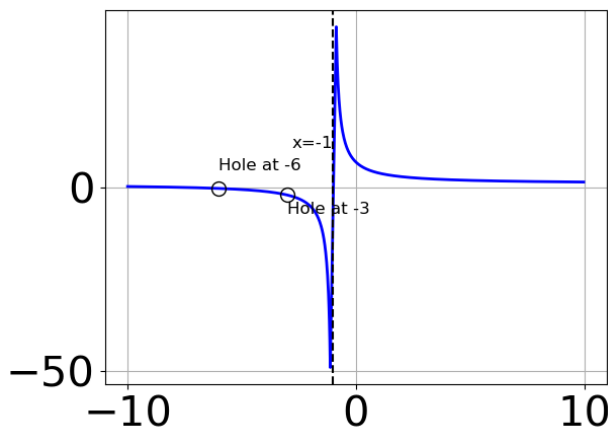
    A. $f(x) = \dfrac{x^3 + 3.0x^2 - 40.0x - 84.0}{x^3 + 10.0x^2 + 27.0x + 18.0}$

    B. $f(x) = \dfrac{x^3 - 16.0x^2 + 81.0x - 126.0}{x^3 - 10.0x^2 + 27.0x - 18.0}$

    C. $f(x) = \dfrac{x^3 + x^2 - 44.0x - 84.0}{x^3 - 10.0x^2 + 27.0x - 18.0}$

    D. $f(x) = \dfrac{x^3 + 16.0x^2 + 81.0x + 126.0}{x^3 + 10.0x^2 + 27.0x + 18.0}$

    E. None of the above are possible equations for the graph.

5. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{6x^3 + 11x^2 - 5x - 12}{12x^2 + 25x + 12}$$

    A. Vertical Asymptotes of $x = -0.75$ and $x = -1.5$ with a hole at $x = -1.333$

    B. Vertical Asymptotes of $x = -0.75$ and $x = -1.333$ with no holes.

C. Vertical Asymptote of $x = 0.5$ and hole at $x = -1.333$

D. Vertical Asymptote of $x = -0.75$ and hole at $x = -1.333$

E. Holes at $x = -0.75$ and $x = -1.333$ with no vertical asymptotes.

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6. Determine the horizontal and/or oblique asymptotes in the rational function below.
$$f(x) = \frac{6x^3 + 13x^2 - 13x - 30}{2x^2 + 3x - 9}$$

A. Horizontal Asymptote of $y = -3.0$ and Oblique Asymptote of $y = 3x + 2$

B. Oblique Asymptote of $y = 3x + 2$.

C. Horizontal Asymptote of $y = 3.0$

D. Horizontal Asymptote of $y = 3.0$ and Oblique Asymptote of $y = 3x + 2$

E. Horizontal Asymptote at $y = -3.0$

---

7. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{6x^2 + 29x + 20}{12x^3 + 76x^2 + 145x + 75}$$

A. Horizontal Asymptote of $y = 0.500$

B. Oblique Asymptote of $y = 2x + 3$.

C. Horizontal Asymptote of $y = 0$

D. Horizontal Asymptote of $y = 0.500$ and Oblique Asymptote of $y = 2x + 3$

E. Horizontal Asymptote at $y = -4.000$

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8. Which of the following functions *could* be the graph below?
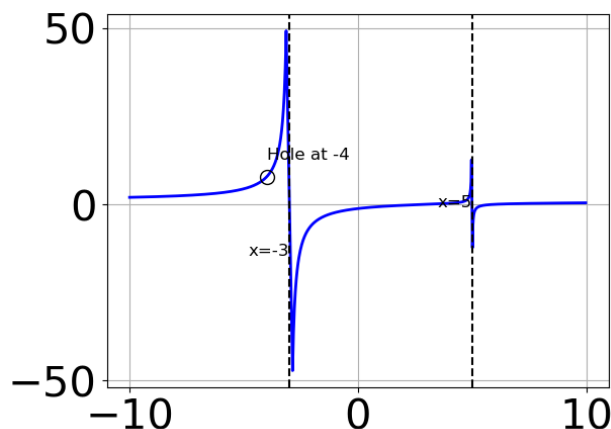
A. $f(x) = \dfrac{x^3 + 5.0x^2 - 18.0x - 72.0}{x^3 - 2.0x^2 - 23.0x + 60.0}$

B. $f(x) = \dfrac{x^3 - 5.0x^2 - 18.0x + 72.0}{x^3 + 2.0x^2 - 23.0x - 60.0}$

C. $f(x) = \dfrac{x^3 + 12.0x^2 + 45.0x + 54.0}{x^3 - 2.0x^2 - 23.0x + 60.0}$

D. $f(x) = \dfrac{x^3 - 2.0x^2 - 45.0x + 126.0}{x^3 + 2.0x^2 - 23.0x - 60.0}$

E. None of the above are possible equations for the graph.

---

9. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{9x^3 - 28x - 16}{9x^2 + 6x - 8}$$

A. Vertical Asymptote of $x = 1.0$ and hole at $x = -1.333$

B. Vertical Asymptote of $x = 0.667$ and hole at $x = -1.333$

C. Vertical Asymptotes of $x = 0.667$ and $x = -0.667$ with a hole at $x = -1.333$

D. Holes at $x = 0.667$ and $x = -1.333$ with no vertical asymptotes.

E. Vertical Asymptotes of $x = 0.667$ and $x = -1.333$ with no holes.

---

10. Determine the vertical asymptotes and holes in the rational function below.
$$f(x) = \frac{12x^3 + 53x^2 + 73x + 30}{12x^2 + x - 6}$$

A. Vertical Asymptotes of $x = 0.667$ and $x = -1.667$ with a hole at $x = -0.75$

B. Vertical Asymptotes of $x = 0.667$ and $x = -0.75$ with no holes.

C. Vertical Asymptote of $x = 0.667$ and hole at $x = -0.75$

D. Holes at $x = 0.667$ and $x = -0.75$ with no vertical asymptotes.

E. Vertical Asymptote of $x = 1.0$ and hole at $x = -0.75$

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11. Determine the horizontal and/or oblique asymptotes in the rational function below.
$$f(x) = \frac{8x^3 + 10x^2 - 9x - 9}{4x^2 + 23x + 15}$$

A. Horizontal Asymptote at $y = -5.0$

B. Horizontal Asymptote of $y = -5.0$ and Oblique Asymptote of $y = 2x - 9$

C. Oblique Asymptote of $y = 2x - 9$.

D. Horizontal Asymptote of $y = 2.0$ and Oblique Asymptote of $y = 2x - 9$

E. Horizontal Asymptote of $y = 2.0$

---

12. Determine the vertical asymptotes and holes in the rational function below.
$$f(x) = \frac{8x^3 + 38x^2 + 15x - 36}{16x^2 + 8x - 15}$$

A. Holes at $x = -1.25$ and $x = 0.75$ with no vertical asymptotes.

B. Vertical Asymptote of $x = -1.25$ and hole at $x = 0.75$

C. Vertical Asymptotes of $x = -1.25$ and $x = -1.5$ with a hole at $x = 0.75$

   D. Vertical Asymptote of $x = 0.5$ and hole at $x = 0.75$

   E. Vertical Asymptotes of $x = -1.25$ and $x = 0.75$ with no holes.

---

13. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{6x^3 - 29x^2 + 43x - 20}{-4x^3 + 28x^2 - 38x + 20}$$

   A. Vertical Asymptote of $y = 2.000$

   B. Horizontal Asymptote of $y = 0$

   C. Horizontal Asymptote of $y = -1.500$

   D. None of the above

   E. Vertical Asymptote of $y = 1$

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14. Which of the following functions *could* be the graph below?
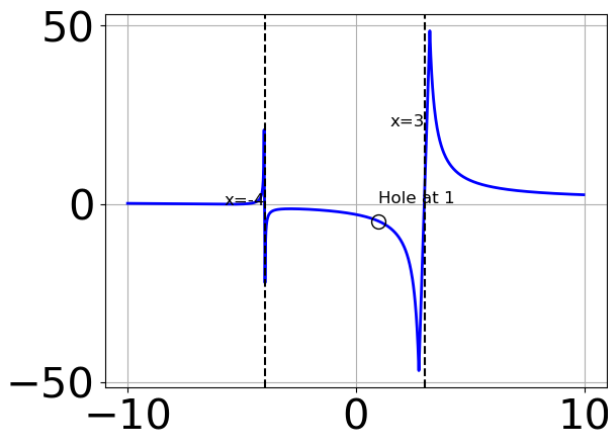
   A. $f(x) = \dfrac{x^3 + 11.0x^2 + 23.0x - 35.0}{x^3 - 13.0x + 12.0}$

   B. $f(x) = \dfrac{x^3 - 5.0x^2 - 49.0x + 245.0}{x^3 - 13.0x - 12.0}$

   C. $f(x) = \dfrac{x^3 - 11.0x^2 + 23.0x + 35.0}{x^3 - 13.0x - 12.0}$

D. $f(x) = \dfrac{x^3 + 18.0x^2 + 107.0x + 210.0}{x^3 - 13.0x + 12.0}$

E. None of the above are possible equations for the graph.

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15. Determine the vertical asymptotes and holes in the rational function below.
$$f(x) = \frac{12x^3 - 1x^2 - 38x + 24}{8x^2 - 18x + 9}$$

A. Vertical Asymptotes of $x = 1.5$ and $x = 0.75$ with no holes.

B. Holes at $x = 1.5$ and $x = 0.75$ with no vertical asymptotes.

C. Vertical Asymptotes of $x = 1.5$ and $x = 1.333$ with a hole at $x = 0.75$

D. Vertical Asymptote of $x = 1.5$ and hole at $x = 0.75$

E. Vertical Asymptote of $x = 1.5$ and hole at $x = 0.75$

---

16. Determine the horizontal and/or oblique asymptotes in the rational function below.
$$f(x) = \frac{6x^3 - 31x^2 + 48x - 20}{3x^2 - 14x + 8}$$

A. Horizontal Asymptote of $y = 4.0$ and Oblique Asymptote of $y = 2x - 1$

B. Horizontal Asymptote at $y = 4.0$

C. Oblique Asymptote of $y = 2x - 1$.

D. Horizontal Asymptote of $y = 2.0$ and Oblique Asymptote of $y = 2x - 1$

E. Horizontal Asymptote of $y = 2.0$

---

17. Determine the horizontal and/or oblique asymptotes in the rational function below.
$$f(x) = \frac{6x^2 + 13x - 15}{18x^3 - 9x^2 - 17x + 10}$$

A. Horizontal Asymptote of $y = 0.333$ and Oblique Asymptote of $y = 3x - 8$

B. Oblique Asymptote of $y = 3x - 8$.

C. Horizontal Asymptote of $y = 0.333$

D. Horizontal Asymptote of $y = 0$

E. Horizontal Asymptote at $y = -3.000$

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18. Which of the following functions *could* be the graph below?
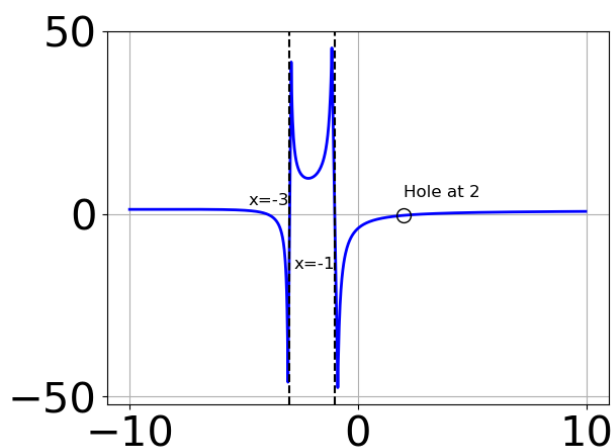
A. $f(x) = \dfrac{x^3 + x^2 - 14.0x - 24.0}{x^3 - 2.0x^2 - 5.0x + 6.0}$

B. $f(x) = \dfrac{x^3 - 4.0x^2 - 17.0x + 60.0}{x^3 + 2.0x^2 - 5.0x - 6.0}$

C. $f(x) = \dfrac{x^3 - 1.0x^2 - 14.0x + 24.0}{x^3 + 2.0x^2 - 5.0x - 6.0}$

D. $f(x) = \dfrac{x^3 - 7.0x^2 - 6.0x + 72.0}{x^3 - 2.0x^2 - 5.0x + 6.0}$

E. None of the above are possible equations for the graph.

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19. Determine the vertical asymptotes and holes in the rational function

below.
$$f(x) = \frac{8x^3 - 42x^2 + 63x - 27}{6x^2 - 5x - 6}$$

A. Vertical Asymptotes of $x = -0.667$ and $x = 1.5$ with no holes.

B. Holes at $x = -0.667$ and $x = 1.5$ with no vertical asymptotes.

C. Vertical Asymptotes of $x = -0.667$ and $x = 0.75$ with a hole at $x = 1.5$

D. Vertical Asymptote of $x = 1.333$ and hole at $x = 1.5$

E. Vertical Asymptote of $x = -0.667$ and hole at $x = 1.5$

20. Determine the vertical asymptotes and holes in the rational function below.
$$f(x) = \frac{6x^3 - 19x^2 - 45x + 100}{9x^2 - 21x + 10}$$

A. Vertical Asymptote of $x = 0.667$ and hole at $x = 1.667$

B. Vertical Asymptote of $x = 0.667$ and hole at $x = 1.667$

C. Holes at $x = 0.667$ and $x = 1.667$ with no vertical asymptotes.

D. Vertical Asymptotes of $x = 0.667$ and $x = -2.5$ with a hole at $x = 1.667$

E. Vertical Asymptotes of $x = 0.667$ and $x = 1.667$ with no holes.

21. Determine the horizontal and/or oblique asymptotes in the rational function below.
$$f(x) = \frac{6x^3 + 5x^2 - 13x - 12}{2x^2 + x - 6}$$

A. Horizontal Asymptote at $y = -2.0$

B. Horizontal Asymptote of $y = 3.0$ and Oblique Asymptote of $y = 3x + 1$

C. Horizontal Asymptote of $y = -2.0$ and Oblique Asymptote of $y = 3x + 1$

D. Horizontal Asymptote of $y = 3.0$

E. Oblique Asymptote of $y = 3x + 1$.

---

22. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{4x^3 - 4x^2 - 33x + 45}{8x^2 - 14x - 15}$$

A. Vertical Asymptote of $x = 0.5$ and hole at $x = 2.5$

B. Vertical Asymptotes of $x = -0.75$ and $x = 2.5$ with no holes.

C. Vertical Asymptote of $x = -0.75$ and hole at $x = 2.5$

D. Vertical Asymptotes of $x = -0.75$ and $x = 1.5$ with a hole at $x = 2.5$

E. Holes at $x = -0.75$ and $x = 2.5$ with no vertical asymptotes.

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23. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{4x^2 - 11x + 6}{20x^3 - 43x^2 + 29x - 6}$$

A. Horizontal Asymptote of $y = 0$

B. Horizontal Asymptote of $y = 0.200$

C. Horizontal Asymptote at $y = 2.000$

D. Oblique Asymptote of $y = 5x + 3$.

E. Horizontal Asymptote of $y = 0.200$ and Oblique Asymptote of $y = 5x + 3$

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24. Which of the following functions *could* be the graph below?
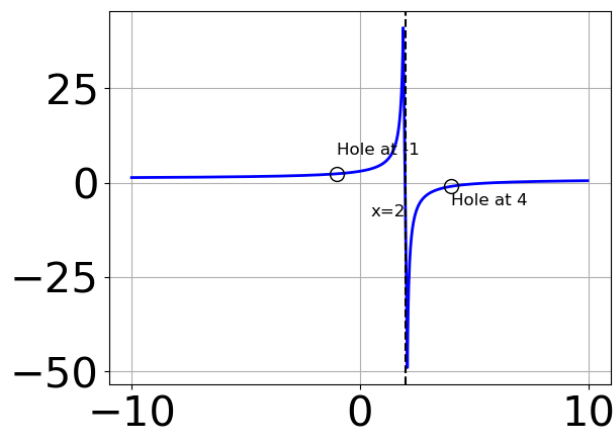
A. $f(x) = \dfrac{x^3 + 3.0x^2 - 34.0x - 120.0}{x^3 - 5.0x^2 + 2.0x + 8.0}$

B. $f(x) = \dfrac{x^3 + 12.0x^2 + 41.0x + 30.0}{x^3 + 5.0x^2 + 2.0x - 8.0}$

C. $f(x) = \dfrac{x^3 - 9.0x^2 + 14.0x + 24.0}{x^3 - 5.0x^2 + 2.0x + 8.0}$

D. $f(x) = \dfrac{x^3 + 9.0x^2 + 14.0x - 24.0}{x^3 + 5.0x^2 + 2.0x - 8.0}$

E. None of the above are possible equations for the graph.

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25. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{9x^3 + 27x^2 - 4x - 12}{6x^2 - 5x - 6}$$

A. Vertical Asymptotes of $x = 1.5$ and $x = -0.667$ with no holes.

B. Holes at $x = 1.5$ and $x = -0.667$ with no vertical asymptotes.

C. Vertical Asymptote of $x = 1.5$ and hole at $x = -0.667$

D. Vertical Asymptote of $x = 1.5$ and hole at $x = -0.667$

E. Vertical Asymptotes of $x = 1.5$ and $x = 0.667$ with a hole at $x = -0.667$

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26. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{6x^3 - 25x^2 + x + 60}{3x^2 - 2x - 8}$$

A. Horizontal Asymptote at $y = 2.0$

B. Horizontal Asymptote of $y = 2.0$ and Oblique Asymptote of $y = 2x - 7$

C. Horizontal Asymptote of $y = 2.0$ and Oblique Asymptote of $y = 2x - 7$

D. Horizontal Asymptote of $y = 2.0$

E. Oblique Asymptote of $y = 2x - 7$.

27. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{24x^3 - 38x^2 - 45x + 50}{-30x^3 + 20x^2 + 35x - 50}$$

A. None of the above

B. Horizontal Asymptote of $y = 0$

C. Vertical Asymptote of $y = -1.000$

D. Vertical Asymptote of $y = 2$

E. Horizontal Asymptote of $y = -0.800$

28. Which of the following functions *could* be the graph below?

Hole at -5
Hole at -6
0
x=-3
−50
−10   0   10
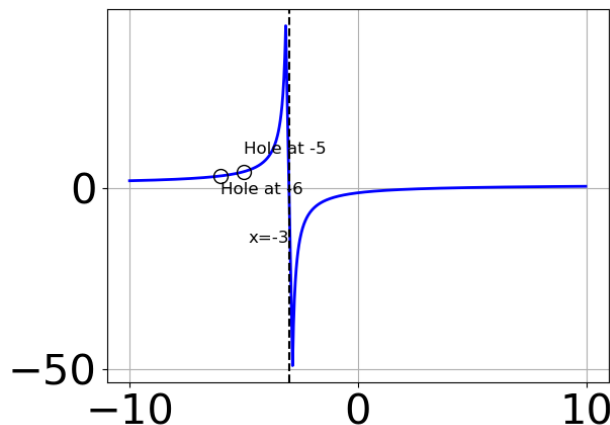
A. $f(x) = \dfrac{x^3 + 7.0x^2 - 14.0x - 120.0}{x^3 + 14.0x^2 + 63.0x + 90.0}$

B. $f(x) = \dfrac{x^3 + 8.0x^2 + 19.0x + 12.0}{x^3 - 14.0x^2 + 63.0x - 90.0}$

C. $f(x) = \dfrac{x^3 - 7.0x^2 - 14.0x + 120.0}{x^3 - 14.0x^2 + 63.0x - 90.0}$

D. $f(x) = \dfrac{x^3 - 8.0x^2 + 11.0x + 20.0}{x^3 + 14.0x^2 + 63.0x + 90.0}$

E. None of the above are possible equations for the graph.

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29. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{6x^3 - 31x^2 + 53x - 30}{6x^2 + 5x - 25}$$

A. Vertical Asymptotes of $x = -2.5$ and $x = 1.5$ with a hole at $x = 1.667$

B. Vertical Asymptote of $x = 1.0$ and hole at $x = 1.667$

C. Vertical Asymptotes of $x = -2.5$ and $x = 1.667$ with no holes.

D. Vertical Asymptote of $x = -2.5$ and hole at $x = 1.667$

E. Holes at $x = -2.5$ and $x = 1.667$ with no vertical asymptotes.

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30. Determine the vertical asymptotes and holes in the rational function
below.
$$f(x) = \frac{9x^3 + 15x^2 - 74x + 40}{6x^2 - 13x + 6}$$

A. Vertical Asymptotes of $x = 1.5$ and $x = 0.667$ with no holes.

B. Vertical Asymptote of $x = 1.5$ and hole at $x = 0.667$

C. Vertical Asymptote of $x = 1.5$ and hole at $x = 0.667$

D. Holes at $x = 1.5$ and $x = 0.667$ with no vertical asymptotes.

E. Vertical Asymptotes of $x = 1.5$ and $x = 1.667$ with a hole at $x = 0.667$